GE Medical Systems

Technical Publications

Direction 2173222−100

Revision 5

AMX−4+ Installation (Model 2169360, 2236420 & 2275938 Series)

Operating Documentation

WARNING

- **THIS SERVICE MANUAL IS AVAILABLE IN ENGLISH ONLY.**
- **IF A CUSTOMER'S SERVICE PROVIDER REQUIRES A LANGUAGE OTHER THAN ENGLISH, IT IS THE CUSTOMER'S RESPONSIBILITY TO PROVIDE TRANSLATION SERVICES.**
- **DO NOT ATTEMPT TO SERVICE THE EQUIPMENT UNLESS THIS SERVICE MANUAL HAS BEEN CONSULTED AND IS UNDERSTOOD.**
- **FAILURE TO HEED THIS WARNING MAY RESULT IN INJURY TO THE SERVICE PROVIDER, OPERATOR OR PATIENT FROM ELECTRIC SHOCK, MECHANICAL OR OTHER HAZARDS.**

AVERTISSEMENT

- **CE MANUEL DE MAINTENANCE N'EST DISPONIBLE QU'EN ANGLAIS.**
- **SI LE TECHNICIEN DU CLIENT A BESOIN DE CE MANUEL DANS UNE AUTRE LANGUE QUE L'ANGLAIS, C'EST AU CLIENT QU'IL INCOMBE DE LE FAIRE TRADUIRE.**
- **NE PAS TENTER D'INTERVENTION SUR LES ÉQUIPEMENTS TANT QUE LE MANUEL SERVICE N'A PAS ÉTÉ CONSULTÉ ET COMPRIS.**
- **LE NON-RESPECT DE CET AVERTISSEMENT PEUT ENTRAÎNER CHEZ LE TECHNICIEN, L'OPÉRATEUR OU LE PATIENT DES BLESSURES DUES À DES DANGERS ÉLECTRIQUES, MÉCANIQUES OU AUTRES.**

WARNUNG

- **DIESES KUNDENDIENST-HANDBUCH EXISTIERT NUR IN ENGLISCHER SPRACHE.**
- **FALLS EIN FREMDER KUNDENDIENST EINE ANDERE SPRACHE BENÖTIGT, IST ES AUFGABE DES KUNDEN FÜR EINE ENTSPRECHENDE ÜBERSETZUNG ZU SORGEN.**
- **VERSUCHEN SIE NICHT, DAS GERÄT ZU REPARIEREN, BEVOR DIESES KUNDENDIENST-HANDBUCH NICHT ZU RATE GEZOGEN UND VERSTANDEN WURDE.**
- **WIRD DIESE WARNUNG NICHT BEACHTET, SO KANN ES ZU VERLETZUNGEN DES KUNDENDIENSTTECHNIKERS, DES BEDIENERS ODER DES PATIENTEN DURCH ELEKTRISCHE SCHLÄGE, MECHANISCHE ODER SONSTIGE GEFAHREN KOMMEN.**

AVISO

- **ESTE MANUAL DE SERVICIO SÓLO EXISTE EN INGLÉS.**
- **SI ALGÚN PROVEEDOR DE SERVICIOS AJENO A GEMS SOLICITA UN IDIOMA QUE NO SEA EL INGLÉS, ES RESPONSABILIDAD DEL CLIENTE OFRECER UN SERVICIO DE TRADUCCIÓN.**
- **NO SE DEBERÁ DAR SERVICIO TÉCNICO AL EQUIPO, SIN HABER CONSULTADO Y COMPRENDIDO ESTE MANUAL DE SERVICIO.**
- **LA NO OBSERVANCIA DEL PRESENTE AVISO PUEDE DAR LUGAR A QUE EL PROVEEDOR DE SERVICIOS, EL OPERADOR O EL PACIENTE SUFRAN LESIONES PROVOCADAS POR CAUSAS ELÉCTRICAS, MECÁNICAS O DE OTRA NATURALEZA.**

ATENÇÃO

- **ESTE MANUAL DE ASSISTÊNCIA TÉCNICA SÓ SE ENCONTRA DISPONÍVEL EM INGLÊS.**
- **SE QUALQUER OUTRO SERVIÇO DE ASSISTÊNCIA TÉCNICA, QUE NÃO A GEMS, SOLICITAR ESTES MANUAIS NOUTRO IDIOMA, É DA RESPONSABILIDADE DO CLIENTE FORNECER OS SERVIÇOS DE TRADUÇÃO.**
- **NÃO TENTE REPARAR O EQUIPAMENTO SEM TER CONSULTADO E COMPREENDIDO ESTE MANUAL DE ASSISTÊNCIA TÉCNICA.**
- **O NÃO CUMPRIMENTO DESTE AVISO PODE POR EM PERIGO A SEGURANÇA DO TÉCNICO, OPERADOR OU PACIENTE DEVIDO A' CHOQUES ELÉTRICOS, MECÂNICOS OU OUTROS.**

AVVERTENZA

- **IL PRESENTE MANUALE DI MANUTENZIONE È DISPONIBILE SOLTANTO IN INGLESE.**
- **SE UN ADDETTO ALLA MANUTENZIONE ESTERNO ALLA GEMS RICHIEDE IL MANUALE IN UNA LINGUA DIVERSA, IL CLIENTE È TENUTO A PROVVEDERE DIRETTAMENTE ALLA TRADUZIONE.**
- **SI PROCEDA ALLA MANUTENZIONE DELL'APPARECCHIATURA SOLO DOPO AVER CONSULTATO IL PRESENTE MANUALE ED AVERNE COMPRESO IL CONTENUTO.**
- **NON TENERE CONTO DELLA PRESENTE AVVERTENZA POTREBBE FAR COMPIERE OPERAZIONI DA CUI DERIVINO LESIONI ALL'ADDETTO ALLA MANUTENZIONE, ALL'UTILIZZATORE ED AL PAZIENTE PER FOLGORAZIONE ELETTRICA, PER URTI MECCANICI OD ALTRI RISCHI.**

警告

・このサービスマニュアルには英語版しかありません。
・ＧＥＭＳ以外でサービスを担当される業者が英語以外の言語を要求される場合、翻訳作業はその業者の責任で行うものとさせていただきます。
・このサービスマニュアルを熟読し理解せずに、装置のサービスを行わないで下さい。
・この警告に従わない場合、サービスを担当される方、操作員あるいは患者さんが、感電や機械的又はその他の危険により負傷する可能性があります。

注意:

- 本维修手册仅存有英文本。
- 非 GEMS 公司的维修员要求非英文本的维修手册时，客户需自行负责翻译。
- 未详细阅读和完全了解本手册之前，不得进行维修。
- 忽略本注意事项会对维修员，操作员或病人造成触电，机械伤害或其他伤害。

Direction 2173222−100

Revision 5

AMX−4+ Installation (Model 2169360, 2236420 & 2275938 Series)

IMPORTANT! . . . X-RAY PROTECTION

X-ray equipment if not properly used may cause injury. Accordingly, the instructions herein contained should be thoroughly read and understood by everyone who will use the equipment before you attempt to place this equipment in operation. The General Electric Company, Medical Systems Group, will be glad to assist and cooperate in placing this equipment in use.

Although this apparatus incorporates a high degree of protection against x-radiation other than the useful beam, no practical design of equipment can provide complete protection. Nor can any practical design compel the operator to take adequate precautions to prevent the possibility of any persons carelessly exposing themselves or others to radiation.

It is important that everyone having anything to do with x-radiation be properly trained and fully acquainted with the recommendations of the National Council on Radiation Protection and Measurements as published in NCRP Reports available from NCRP Publications, 7910 Woodmont Avenue, Room 1016, Bethesda, Maryland 20814, and of the International Commission on Radiation Protection, and take adequate steps to protect against injury.

The equipment is sold with the understanding that the General Electric Company, Medical Systems Group, its agents, and representatives have no responsibility for injury or damage which may result from improper use of the equipment.

Various protective material and devices are available. It is urged that such materials or devices be used.

CAUTION: United States Federal law restricts this device to use by or on the order of a physician.

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If you have any comments, suggestions or corrections to the information in this document, please write them down, include the document title and document number, and send them to:

GENERAL ELECTRIC COMPANY
MEDICAL SYSTEMS

MANAGER – INFORMATION INTEGRATION, AMERICAS W–622
P.O. BOX 414
MILWAUKEE, WI 53201–0414

CERTIFIED ELECTRICAL CONTRACTOR STATEMENT

All electrical installations that are preliminary to positioning of the equipment at the site prepared for the equipment shall be performed by licensed electrical contractors. In addition, electrical feeds into the Power Distribution Unit shall be performed by licensed electrical contractors. Other connections between pieces of electrical equipment, calibrations, and testing shall be performed by qualified GE Medical personnel. The products involved (and the accompanying electrical installations) are highly sophisticated, and special engineering competence is required. In performing all electrical work on these products, GE will use its own specially trained field engineers. All of GE's electrical work on these products will comply with the requirements of the applicable electrical codes.

The purchaser of GE equipment shall only utilize qualified personnel (i.e., GE's field engineers, personnel of third-party service companies with equivalent training, or licensed electricians) to perform electrical servicing on the equipment.

DAMAGE IN TRANSPORTATION

All packages should be closely examined at time of delivery. If damage is apparent, have notation "**damage in shipment**" written on **all** copies of the freight or express bill **before** delivery is accepted or "signed for" by a General Electric representative or a hospital receiving agent. Whether noted or concealed, damage **MUST** be reported to the carrier **immediately** upon discovery, or in any event, within **14** days after receipt, and the contents and containers held for inspection by the carrier. A transportation company will not pay a claim for damage if an inspection is not requested within this **14** day period.

Call Traffic and Transportation, Milwaukee, WI (414) 827−3449 / 8*285−3449 **immediately** after damage is found. At this time be ready to supply name of carrier, delivery date, consignee name, freight or express bill number, item damaged and extent of damage.

Complete instructions regarding claim procedure are found in Section "S" of the Policy & Procedure Bulletins.

6/17/94

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REVISION HISTORY

REV	DATE	REASON FOR CHANGE
A	Oct. 30 1996	Initial draft.
0	Dec. 13, 1996	Initial release.
1	Mar. 7, 1997	Deleted requirement for signature testing for new−from−factory installations (Section 4).
2	Aug. 14, 1997	High Impact Inspection.
3	Dec. 10, 1997	Added touchup paint to Section 1.
4	Apr. 12, 1999	Added AMX−4+ Model 2236420 Series.
5	Nov. 8, 2000	Added AMX−4+ Model 2275938 Series.

LIST OF EFFECTIVE PAGES

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SECTION 1
INTRODUCTION

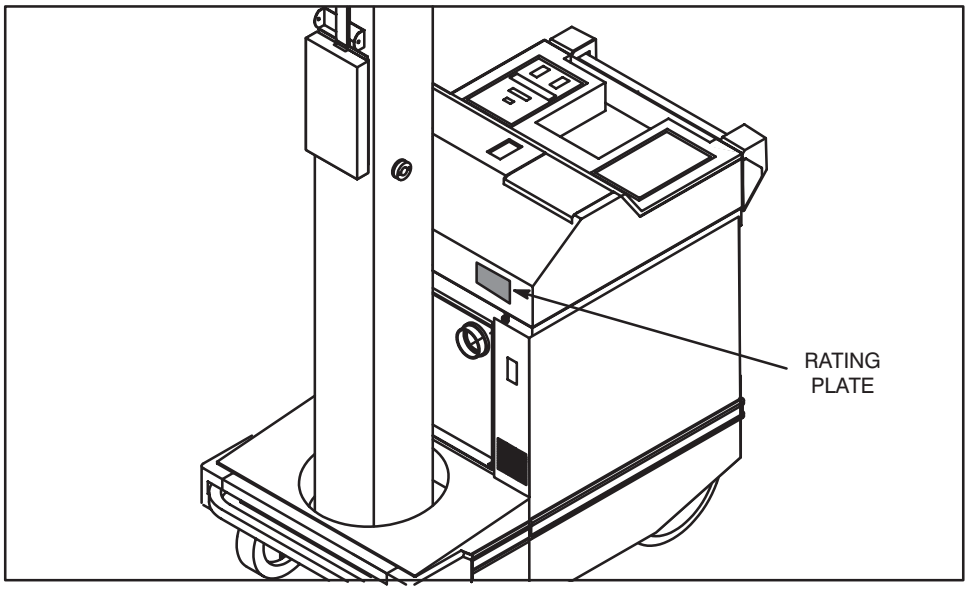
1-1 Identification

See Illustration 1−1. The AMX−4+ is identified by Model Number on the rating plate located on the top cover (see Table 1−1). Model part and catalog numbers are identified in Table 1−1.

TABLE 1−1
AMX−4+ MODELS

DESCRIPTION	PART NUMBER	CATALOG NUMBER	PART NUMBER	CATALOG NUMBER
DOMESTIC	2169360−7	A0659F	2236420−7 & 2275938−7	A0659JF
DOMESTIC, AEC	2169360−8	A0659FA	2236420−8 & 2275938−8	A0659JG
DOMESTIC, TECH SWITCH	2169360−9	A0659FC	2236420−9 & 2275938−9	A0659JH
DOMESTIC, AEC, TECH SWITCH	2169360−10	A0659FB	2236420−10 & 2275938−10	A0659JJ
IEC, EMC	2169360	A0659A	2236420 & 2275938	A0659J
IEC, EMC, AEC	2169360−2	A0659AA	2236420−2 & 2275938−2	A0659JA
IEC, EMC, TECH SWITCH	2169360−3	A0659AB	2236420−3 & 2275938−3	A0659JB
IEC, EMC, AEC, TECH SWITCH	2169360−4	A0659AC	2236420−4 & 2275938−4	A0659JC
JAPAN	2169360−5	A0659C	2236420−5 & 2275938−5	A0659JD
JAPAN SHORT COLUMN	2169360−6	A0659D	2236420−6 & 2275938−6	A0659JE

ILLUSTRATION 1−1
AMX−4+ IDENTIFICATION



1-2 General

Satisfactory equipment performance requires the use of service personnel specially trained on x−ray apparatus. The General Electric Company, Medical Systems, is responsible for the effects on safety, reliability, and performance only if the following conditions are met:

- The electrical wiring of the relevant rooms complies with all national and local codes.
- All assembly operations, extensions, re−adjustments, modifications or repairs are carried out by General Electric Company, Medical Systems, authorized service representatives.
- The equipment is used in accordance with the instructions for use. Refer to Direction 2166913−100, *AMX−4+ Operating Manual,* or Direction 2166911−100, *AMX−4+ International Operation,* for proper operating procedures.

Only trained and qualified personnel should be permitted access to the internal parts of this equipment.

The environmental limits and power requirements for the AMX−4+ are listed in Direction 2173221−100 *AMX−4+ Ratings and Specifications*.

1-3 Furnished Items

Check the drawer for the items listed in Table 1−2.

TABLE 1−2
FURNISHED ITEMS

Reference No.	Description	Comments
46−270800G5	Handswitch	
46−303652P2	Keyswitch	
46−2114831	Application Video Tape	Domestic models only.
Direction 46−017216	AMX Technique Chart	Only English version is provided with domestic models. French, Spanish, German, and Italian are provided with International shipments.
Direction 2166913−100 Direction 2166911−100	AMX−4+ Operating Manual AMX−4+ International Operation	Furnished with all AMX−4+ Models Furnished with International Models
Direction 2166910−100	AMX−4+ Documentation	Consists of: TAB 1 Direction 2173221−100, *AMX−4+ Ratings and Specifications* TAB 2 Direction 2173222−100, *AMX−4+ Installation* TAB 3 Direction 2173223−100, *AMX−4+ Calibration* TAB 4 Direction 46−013288, *Bleeder, High−Voltage Dual Type* TAB 5 Direction 2173224−100, *AMX−4+ Functional Checks* TAB 6 Direction 2173225−100, *AMX−4+ Service* TAB 7 Direction 2196272−100, *High Voltage Cable Installation & Troubleshooting Procedures* TAB 8 Direction 2173227−100, *AMX−4+ Periodic Maintenance* TAB 9 Direction 2190775−100, *Stranded Steel Cable Inspection* TAB 10 Direction 2173228−100, *AMX−4+ (model 2169360 series) Renewal Parts* TAB 10 Direction 2237257−100, *AMX−4+ (model 2236420 & 2275938 series) Renewal Parts* TAB 11 Direction 2173229−100, *AMX−4+ Schematics*
Direction 46−017226	Tube Ratings, HRT X−ray Tube, 50 and 60 Hz	
2236721−100	Product Data Sheet, Maxiray 75 TH 11 X−ray Tube	
Direction 46−017401	Signature Tests for AMX−4 Series	Includes factory data
46−279732P5	Mobil−AID D1300 Manual	Models with factory installed AEC only
Form F2995	Tube Warranty Form	
Form F3385MX	Data Record for HHS Field Tests	
46−279518P1	Pen	For marking on Technique Chart
46−315954P1	Film Bin Caution Label	English/French
46−315954P2	Film Bin Caution Label	English/Spanish
46−315954P3	Film Bin Caution Label	English/German
46−315954P4	Film Bin Caution Label	English/Italian
46−315954P5	Film Bin Caution Label	English/Japanese

1-4 Tools and Materials

In addition to the standard service representatives tool kit, the following items are required:

- Direction 2173221−100, *AMX−4+ Ratings & Specifications* and associated tools and materials.
- Direction 2173223−100, *AMX−4+ Calibration* and associated tools and materials.
- Direction 2173224−100, *AMX−4+ Functional Check* and associated tools and materials.
- Direction 2173225−100, *AMX−4+ Service* and associated tools and materials.

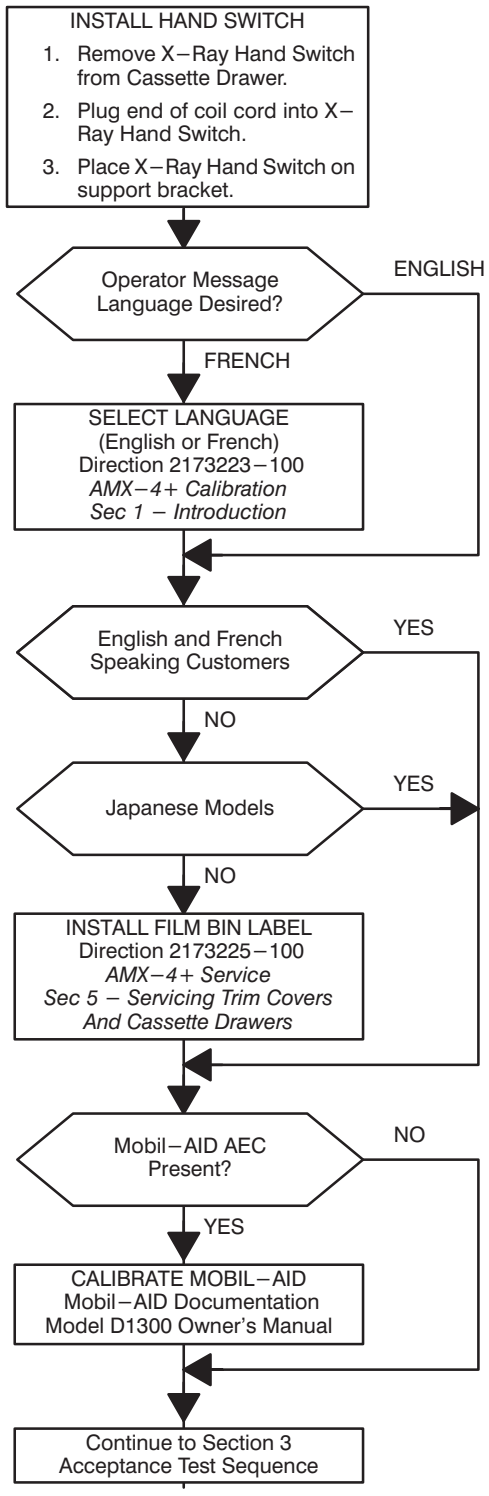
TABLE 1−3
TOUCHUP PAINT

Reference No.	Description	Comments
46−303460P1	Mist Gray Touchup Paint	0.6 Fl Oz (17.7 mL) Bottle
2180026	Grey #4 Touchup Paint	0.6 Fl Oz (17.7 mL) Bottle

SECTION 2
INSTALLATION SEQUENCE

The following flow chart shows the recommended sequence for performing an installation on the AMX−4+.

ILLUSTRATION 2−1
INSTALLATION SEQUENCE FOR AMX−4+



Note: All AMX−4+ models are factory set for English Operator Messages

Note: All Domestic and IEC AMX−4+ models have a factor installed Enlish/ French bin label.

Note: Japanese AMX−4+ models have a factory installed English/ Japanese bin label.

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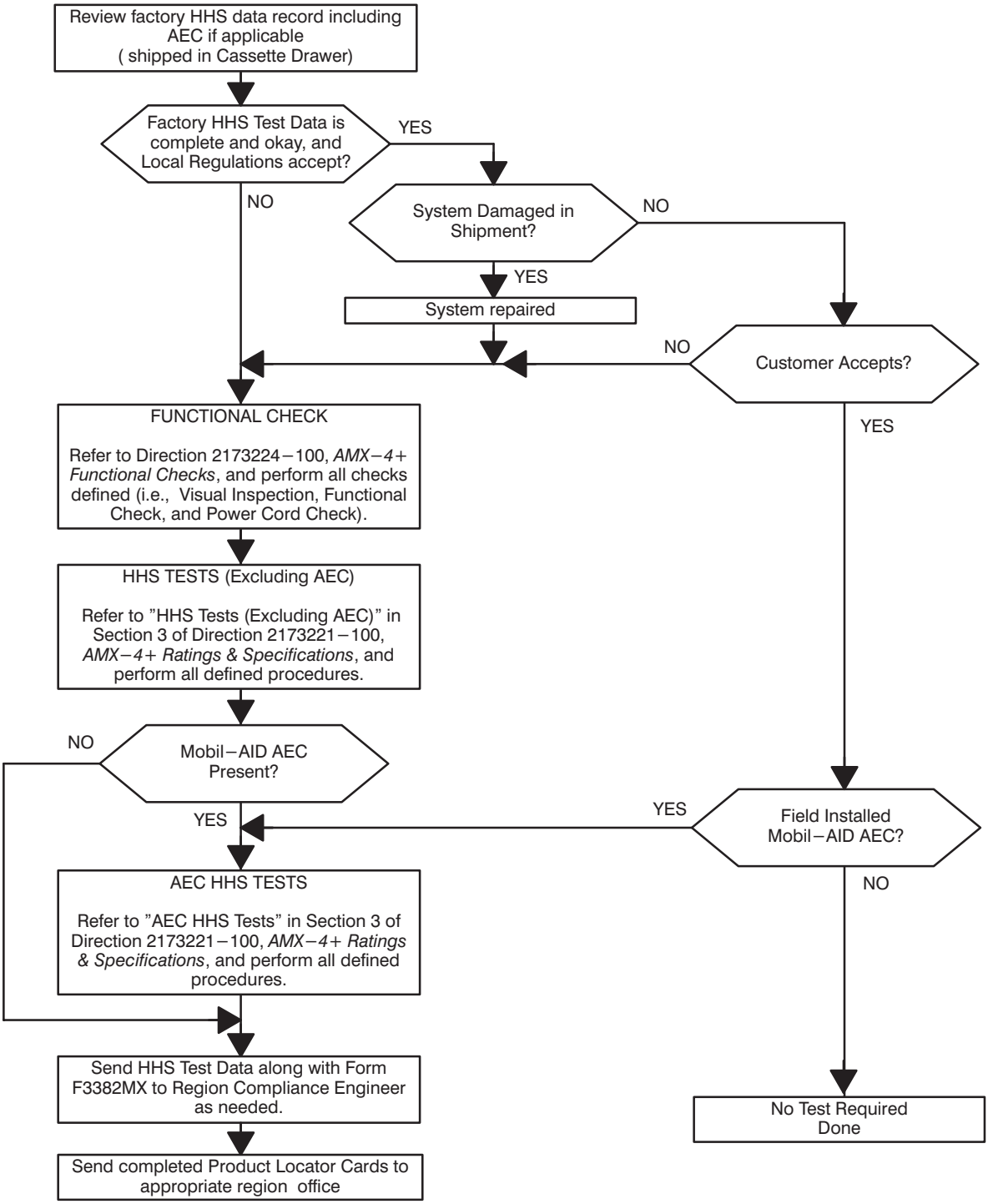
SECTION 3
ACCEPTANCE TEST SEQUENCE

The flow chart in Illustration 3−1 shows the recommended sequence for performing an installation acceptance test on the AMX−4+.

ILLUSTRATION 3−1
ACCEPTANCE TEST STEERING



3-1 Need for Acceptance Testing

Based on the experience with the AMX−4, field tracking abd including HHS Signature testing, it has been determined that in many cases acceptance testing is not required for the AMX−4+.

1. The AMX−4+ undergoes complete inspection, calibration, qualification testing in the factory prior to shipments
2. A full HHS test is performed in the factory for the AMX−4+, including for factory installed Mobil−AID AEC.
    a. For all models, a copy of the HHS test data has been included within the cassette drawer of the unit when it was shipped.
    b. For all U.S. customer orders, the Assembler's Report, Federal Form FD2579 is completed at the factory. It is forwarded to the region compliance engineer at the time the system ships for follow−up and filing with the FDA.

Therefore, the customer, installer, and/or regionl compliance engineer need to determine if acceptance testing is required during installation. Some questions to be answered in this decision, though not necessarily all, are shown in Illustration 3−1.

3-2 Finish

Send in the following test data (with AMX−4+ Serial Number filled in on each document) to appropriate region filing office:

- Factory HHS Test Data
- Form F3382MX (the condensed version of Form F3382, dedicated specifically to mobile x−ray units) as applicable.

Note: If a Mobil−Aid AEC is factory installed on the generator, look at the furnished factory HHS test data to verify that AEC HHS tests ("Reproducibility of Exposure, AEC Mode" and "AEC Minimum Exposure time") were done at the factory.

Note: If a Mobil−Aid AEC is field installed on the generator, HHS testing for the AEC function must be done in the field. A copy of Form F3382MX filled in for "AEC Minimum Exposure Time" and for the AEC Mode portion of "Reproducibility of Exposure" must be sent to the appropriate region filing office, regardless of whether or not Form F3382MX is required for the generator and collimator functions.

Note: Do NOT send any copies of Form F3382MX to headquarters.

Complete and file Product Locator Cards with appropriate region filing office. Use salmon colored envelope to mail installation set with red stripe.

APPENDIX − SYMBOLS

All symbols used on the equipment and in its accompanying documents are shown and explained in this appendix.

Caution advises of an avoidable condition that could cause minor physical injury, or damage to equipment or data.

Warning advises of an avoidable condition that may allow or cause a personal injury or the catastrophic destruction of equipment or data.

Danger advises of an avoidable condition that will cause serious or fatal injury.

Type B Equipment. Internal electrical power source provides an adequate degree of protection against electrical shock.

X−ray emission. X−ray tube head is emitting x−rays. Take adequate precautions to prevent the possibility of any persons carelessly, unwisely, or unknowingly exposing themselves or others to radiation.

Battery power on. This does not apply mains voltage.

Battery power off. This does not remove mains voltage.

Control for indicating radiation field by using light.

Collimator blades closed. The controlled blades are shown in thicker lines.

Collimator Blades open. The controlled blades are shown in thicker lines.

Functional Earth (ground) Terminal. Terminal directly connected to a point of a measuring supply or control circuit or to a screening part which is intended to be earthed for functional purposes.

Alternating Current. Indicates equipment that is suitable for alternating current only.

Direct Current. Indicates equipment that is suitable for direct current only.

Equipotentiality. Identifies terminals that bring the various parts of equipment or systems to the same potential when connected together. These terminals are not necessarily at earth (ground) potential. The value of the potential may be indicated next to the symbol.

Indicates lock release or brake release.

Indicates receptacle location for hand−held radiographic prep/expose and field−light control cable.

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